application to the teeth of wheels and for other purposes. This communication and also Mr. Forster Brown's are to be printed *in extenso* in the *Proceedings* of the Association. The instrument was a very beautiful one, and the difficult problem it solved had been most carefully worked out; but here again a very poor discussion followed, because no one felt able to criticise the instrument or discuss the advantages or disadvantages of such a piece of apparatus after merely hearing the author's short account; a description with sufficient diagrams ought to have been weeks before in the hands of those anxious to become acquainted with it, and to discuss it.

Amongst other papers dealt with was Mr. Dibdin's paper on the treatment of sewage by bacteria, which in the discussion elicited from Sir Alex Binnie the statement that the experiments he was carrying out for the London County Council led him to believe we were on the eve of most important changes in the treatment of town sewage.

SCIENCE IN RELATION TO TRADE.

DURING the last few years numerous references have appeared in the various reports made to the Foreign Office by Her Majesty's diplomatic and consular officers on the methods adopted by the principal trade rivals of the United Kingdom in their competition in foreign trade abroad, and on the apparent supineness of British traders in meeting this competition. Besides calling attention to this, the Consuls suggest the adoption of certain measures which they consider would be advisable for British traders to take with a view of retaining the pre-eminence of this country on foreign markets.

A selection has been made of the views expressed in some of these reports issued during the period comprised between January 1896 and the present time, and has just been published in a Blue Book.

From the 171 extracts in this publication it appears that the following are some of the causes which are considered as tending to place British trade at a disadvantage in those districts where, especially of late years, foreign competition has been more than usually keen:—

I. The disinclination of British traders—
  (*a*) To supply a cheaper class of goods.
  (*b*) To be content with a small order at first.
  (*c*) To study a customer's wishes.
  (*d*) To adopt the metric system in calculations of weight, cost, &c.
  (*e*) To grant credit facilities.

II. The scarcity of British commercial travellers, in comparison with those of other nationalities, their ignorance of the language of the countries they visit, and the endeavour to supply their place by a lavish distribution of catalogues and other matter printed in English only.

III. The inferiority of the British to the German and American methods of packing.

IV. The additional cost of goods caused by the high rates of freight on British lines of steamers.

V. The frequency of strikes in the United Kingdom tending to cause uncertainty in the delivery of orders.

VI. The development of technical education in Germany and the greater attention paid in schools to modern languages, added to the system of sending young Germans all over the world to acquire a practical knowledge of the language, business habits, &c., of other countries, by means of which they are afterwards able to compete with those countries with a greater chance of success.

The two causes which concern us rerer to the use of the metric system and the development of technical education in Germany. On these matters the Blue Book contains the following summary of the views expressed in the reports:—

METRIC SYSTEM.

The Consuls all lay stress upon the uselessness and expense of British exporters forwarding trade circulars and catalogues more or less well-prepared in English, and with English weights and measures calculated in our own currency. British weights and measures are not liked abroad, and are in many cases either not understood at all, or very imperfectly so, and the preference is given to those who accommodate themselves to the metric and decimal systems. On this point the Consul at Naples expresses himself as follows:—"It seems absurd that the first commercial nation in the world should measure their horses by hands and their dogs by inches, their cloth by ells and their calico by yards; that such impossible numbers should come into their square measure as 30¼ and 4840, and in their measure of solidity as 1728. And the weights are worse still. It can never be too much impressed upon British traders that all goods for sale on the continent should be marked in metres and kilogs, and all catalogues sent to the continent should be in a language which is understood by the people of the country."

TECHNICAL EDUCATION.

Much has been written respecting the superiority of the German technical education to that of Great Britain, and to this has been attributed the success which is said to have attended German commercial enterprise within the last twenty-five years That the technical education is better than that in England is denied by many Germans who are competent to express an opinion, having studied the question in both lands; but what they do admit is that the application of this education in Germany is carried out to a more practical and useful conclusion than in England. "Thus," says the Consul at Stettin, "in Great Britain there are numerous public and private schools having a modern side in their curriculum which is an excellent adaptation of what is termed in Germany the "real gymnasium"; but in how many English schools is the modern side looked down upon by the head master and consequently by the boys themselves; and the classic side held up as the education which befits a gentleman! . . . Undoubtedly the far greater majority of British lads, on the completion of their education, become what is vaguely termed men of business, and at the present day it is an absolute necessity for the carrying on of that business against the keen competition which, owing to European peace, has manifested itself in foreign lands during the last twenty-five years, that we, as a nation of merchants, should be able to deal with our customers in their own tongues; and for this purpose it is of the utmost importance that the youth of Great Britain should be instructed for the most part in living languages."

Again, attention is called in the reports to the fact that Germans have been gradually paving their way to their present position by quiet individual persistence backed up by special education. It is stated that they are in the habit of going as clerks into British houses at home and abroad and gradually obtaining a thorough knowledge of the British way of doing business, of the centres of production, &c., which they subsequently turn to good account; but some doubts are expressed as to whether any German houses would receive an Englishman in the same way even if he possessed the necessary qualifications. On this point the British Vice-Consul at Porto Alegre says: "Germans can generally speak English and French practically and usefully, and were taken into English houses at first because they were content with little, and sometimes even no salary, in order to pick up business. On the other hand, the English clerk usually understands no language but his own, and this deficiency alone would be enough to prevent his being taken on as a clerk in a German house. Twenty or thirty years ago the important export trade of this State was almost exclusively in the hands of British merchants; now it is in German hands."

THE DEVELOPMENT OF THE TUATARA LIZARD.

PROF. A. DENDY, professor of biology in Canterbury College, New Zealand, has been engaged for the past two years in investigating the development of the Tuatara Lizard, perhaps the most remarkable animal now living in New Zealand, and the oldest existing type of reptile. A short summary of the principal scientific results obtained was sent to London just in time to be laid before the Royal Society at its final meeting for the session in June last. The memoir itself, containing a detailed account of the general development, with numerous illustrations, has now arrived in England, and will shortly be published. Meanwhile, the following particulars, published in the *Christchurch Press*, will be of interest to naturalists:—The development of the Tuatara presents several remarkable features. The eggs are laid in November, and on Stephen's Island take about thirteen months to hatch, the embryos passing the winter in a state of hybernation, unknown in any other vertebrate embryos. Before entering upon their winter sleep the nostrils of the embryo

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become completely plugged up by a growth of cellular tissue. The embryos obtained have been classified in sixteen stages. The early stages of development are singularly like the corresponding stages in the Chelonia, especially as regards the fœtal membranes; there being a long canal behind the embryo leading to the exterior, and known as the posterior amniotic canal, which has hitherto been found only in Chelonians, in which it was discovered a few years ago by Prof. Mitsukuri, of Tokyo. Prof. Dendy's results thus strongly confirm the views of those naturalists who regard the Tuatara as being at least as closely related to the turtles as it is to the lizards. In the later stages of the development the young animal has a strongly developed pattern of longitudinal and transverse stripes, which disappear before hatching, the adult animal being usually spotted. This observation is a striking confirmation of the general laws of coloration observed in young birds and mammals, which are commonly striped. The eggs which Prof. Dendy investigated were collected for him by Mr. P. Henaghan, principal keeper on Stephen's Island, who showed indefatigable zeal in the pursuit, and made many valuable observations on the habits of the Tuatara. Permission was granted to Prof. Dendy by the Government to collect both eggs and specimens for scientific investigation, and the result of Mr. Henaghan's observations has been to show that eggs can be obtained all the year round by those who know where to look for them. Fortunately for the Tuatara Mr. Henaghan appears to be the only collector who does know at present, and it is to be hoped that before his knowledge is made public the Government will take steps to prohibit the taking of eggs as well as of adults, for we believe the wording of the Act leaves the eggs unprotected. We believe that two German collectors have lately made vigorous, but as yet unsuccessful, efforts to collect the eggs.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Cambridge.—Mr. E. W. Barnes, bracketed Second Wrangler 1896, Class I., first division Mathematical Tripos, Part II, 1897, has been elected to a fellowship at Trinity College.

Prof. Liveing has been appointed a University Governor of the South-eastern Agricultural College, Wye, for five years.

Prof. Flinders Petrie has presented to the Museum of Anatomy and Anthropology nineteen cases of skulls and bones from his excavations at Hierakonopolis, including remains of the prehistoric and earliest dynastic races in Egypt. Prof. Macalister remarks that with this addition the University collections in Egyptian anthropology are probably the largest in Europe; it consists of specimens representing all periods of Egyptian history from prehistoric times down to the battle of Tel-el-Kebir.

Prof. Foster will this term give a weekly lecture on the history of Physiology. The first lecture, on Monday, October 24, will be on Claude Bernard.

The Reader in Geography, Mr. Yule Oldham, lectures this term on the geography of Europe and on physical geography.

The University of Sydney is to become affiliated to the University of Cambridge, and students in arts or in science who have pursued a certain course at Sydney will be entitled to the privileges of affiliated students.

Mr. John Corbett, formerly M.P. for Mid-Worcestershire, has offered to give 50,000*l*. for founding and endowing a school of agriculture for sons of tenant farmers for the county of Worcester and district.

One of the most recent of the many educational conferences held in the United States during the past ten years, was that of a Committee on Physical Geography appointed under the National Educational Association. As is usual in such cases, the members of the Committee were selected from a wide range of educational institutions, including universities, colleges, endowed schools, and public schools (in the American sense of the term); the expert in the scientific aspects of the subject being thus associated with the practised teacher, who is familiar with the capacities and limitations of young scholars. The preliminary report of the Committee is published in the *Journal of School Geography* for September. It is strongly urged that the physical environment of man should constitute the leading theme of the subject, and that irrelevant items from astronomy, principles of physics, topics from historical geology, and the classification of animals and plants should be carefully excluded, in order to give time for the proper development of physical geography itself.

Three members of a series, to be known as the Harvard geographical models, constructed by Mr. G. C. Curtis from designs by Prof. W. M. Davis, have been reproduced in a durable composition by Messrs. Ginn and Co., educational publishers, Boston, Mass., as aids in systematic geographical teaching. The models, 25 by 19 inches in size, may be used in elementary classes in illustration of type forms, such as mountains, peaks, ridges, glaciers, valleys, plains, volcanoes, capes, islands, rivers, lakes, deltas, bays, &c. They also serve for more advanced instruction in rational or explanatory physical geography. The second model is derived from the first by elevation, whereby a low and flat coastal plain is added to the mountainous background. The third is derived from the first by depression, whereby the valleys among the mountains are transformed into bays, and the ridges stand forth as promontories, the coast-line being changed from a simple to a very irregular outline. Many applications of the principles thus taught may be made in all grades of geographical teaching.

The annual meeting of the governors of University College, Liverpool, was held on Saturday last. The Earl of Derby, president of the college, occupied the chair, and, in moving the adoption of Principal Glazebrook's report, which was of a very satisfactory character, he said that though much had been done, much yet remained to be accomplished. A pressing need was a proper building for the department of physics, and another very pressing need was a suitable building for the school of human anatomy. Prof. Oliver Lodge deserved to be furnished with adequate means for the important work in which he was engaged. That, however, might be postponed so that the more pressing equipment of a building for the school of human anatomy might be provided. The cost would be about 20,000*l*., and he would contribute a quarter of this sum if other benefactors were forthcoming. It was announced by the treasurer that besides the 5000*l*. from Lord Derby, he had that day received a cheque for 2000*l*. from Mr. Ralph Brocklebank, for the school of anatomy. Incidentally it was mentioned that the land, buildings, and endowments of University College represented a total value of 400,000*l*., though the college was founded only in October 1880.

Copies of the prospectuses of the Day and Evening Classes held at the South-Western Polytechnic have been received. This Polytechnic has been built and equipped at a cost of nearly 55,000*l*., the greater part of which has been raised by voluntary subscriptions. The institute at present possesses a fixed endowment of 1500*l*. annually from the Charity Commissioners. The London County Council will also contribute to the institute an annual sum, depending upon the amount of educational work carried on; and it is anticipated that this contribution will average about 3500*l*. annually. The Principal is Prof. Herbert Tomlinson, F.R.S., and from the prospectuses referred to we see that the operations of the institute are of a kind which will benefit industry and encourage scientific study. The Day College comprises two departments, viz. the technical department, in which students are instructed in the principles of applied science, and the general department, which aims at giving a general education, or special training in science, art, literature, or commerce. The evening classes and lectures are designed to supplement, and not to supersede, the training of the workshop. Among the subjects taught in the mathematical classes we notice the calculus and its application to electrical and other engineering problems. The subjects taught at the Polytechnic cover a wide range, as they also do in other London polytechnics; and they provide all who wish to learn with facilities for doing so.

The trustees of the late Sir Edwin Chadwick have founded in memory of the great sanitarian a course of lectures and demonstrations in municipal hygiene at University College, London, and have devoted a sum of 700*l*. a year to the endowment of a chair of municipal engineering and a lectureship of municipal hygiene. They have given the further sum of 1000*l*. for the purpose of instruments and appliances, and for the amplification of existing laboratories. The *British Medical Journal* reports that, on Wednesday, October 12, Prof. Osbert Chadwick, son of Sir Edwin Chadwick, delivered an inaugural address opening the first course. After giving a sketch of the history of the

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